E

RNC EXECUTIVE SUMMARY

E.1 OVERVIEW

This is the Final Report of the Phase 1 Evaluation of Efficiency Vermont's (EVT's) Residential New Construction Program (RNC). The overall goal of the RNC is to increase the energy efficiency of new homes built in Vermont, primarily by providing technical assistance, marketing support and financial incentives for adoption of efficient construction practices to builders and remodelers. This evaluation develops a comprehensive description of the residential new construction market in Vermont and assesses the accomplishments of the program from its inception in March 2000 through November 2002.

E.1.1 Program Description and Operations through May 2002

Program Objectives. The objectives of Efficiency Vermont's Residential New Construction program as stated in the original program plan are to:

- Increase market recognition of superior construction promoted by the pre-existing Vermont Star Home program;
- Increase awareness and compliance with the Vermont Residential Building Efficiency Standard;
- Increase penetration of cost-effective electric and fossil-fuel energy efficiency measures;
- Improve occupant comfort, health and safety;
- Institutionalize Home Energy Ratings, and
- Increase the use of mortgage benefits for energy-efficient homes.

Program Development. A consortium of Vermont electric utilities jointly operated a predecessor program known as Vermont Star Homes for more than two years prior to the start up of Efficiency Vermont. The program was operated by a contractor – Vermont*wise* Energy Services of Rochester. Efficiency Vermont (EVT) contracted with Vermont*wise* Energy Services to deliver the EVT residential new construction program, and retained most of its key features. The Vermont Gas Systems ("VGS") offered their own residential new construction program known as HomeBase, as did the Washington Electric Cooperative and the Burlington Electric Department.

The Vermont Star Program began operating under contract to EVT in March 2000. In 2001, EVT and VGS worked together to develop a unified program to be delivered statewide. The consolidated program – Vermont Energy Star Homes ("VESH") –features revised qualifying specifications and rebate structures, as well as additional services to participating builders. From

an operational standpoint, the major difference between Vermont Energy Star Homes and earlier versions of the EVT program is that the basic offer to builders and homeowners has been simplified, as has the incentive structure. The VESH program went into effect January 1, 2002, with a six-month transition period during which previously enrolled participants could choose to complete construction under Vermont Star, HomeBase, or VESH standards.

Program Services, Incentives, and Operations. The program offers the following services and incentives.

- ***Eligible projects.*** The program offers incentives for new construction or substantial renovation projects in single-family homes and multi-family residential buildings of three stories or less.
- ***Qualifying standards and incentive levels.*** To qualify for the Vermont Energy Star Home designation, a house must achieve a Home Energy Rating score of 86 points, or 5 Star, which is equivalent to the U. S. Environmental Protection Agency's ENERGY STAR home rating. Generally, homes must contain high levels of insulation, efficient heating and hot water equipment, and high-quality air sealing measures to meet this rating. Homes that score 86 or above in the Home Energy Rating will use approximately 20 percent less energy for heating, cooling, and hot water than those that meet the minimum requirements of Vermont's Residential Building Energy Standard (RBES). In addition to the 86 point home energy rating, VESH-qualifying homes must have least four energy-efficient lighting fixtures in high use areas, hard-ducted returns above the first floor deck for forced hot air systems, power-vented or sealed combustion equipment, and efficient mechanical ventilation systems.

  The owners or builders of Vermont Energy Star qualifying homes receive a home energy rating at no cost as part of the program, a $500 value. In addition, they may also receive rebates up to approximately $1,300 in most of the state or up to $1,800 in VGS territory for installation of efficient lighting fixtures and appliances. Additional services for builders of Vermont Energy Star Homes in include plan review and eligibility to participate in technical training programs and to receive marketing support for qualifying homes.

Program Accomplishments through December 2001. In its first 10 months of operation (through December 2000), the program issued 323 rebates for home energy ratings: 106 of them for homes qualifying for Vermont Star designation; 217 for Vermont Advantage participation, a lower level defined in pre-existing programs. An additional 192 customers received rebates for the installation of specific measures without energy ratings. Customers who received home energy ratings through the program also received rebates for the installation of qualified energy efficiency equipment. The typical package of measures for such projects included an average of nine compact fluorescent lighting fixtures and a mechanical ventilation system.

In 2001, the program accomplished the following.

- ***Builder participation.*** 85 builders submitted preliminary applications for project qualification to the program in 2001, including 40 who had not participated in the previous year.
- ***Volume of participation.*** 699 units in single- and multi-family construction projects applied for program assistance; 623 units received rebates for the installation of energy efficient measures/and or qualification under the home rating component of the program. These "completed units" represent 22.6 percent of all new housing units built in Vermont in 2001.
- ***Vermont Star designation.*** 196 of the completed construction projects received Vermont Star Designation. representing 8.3 percent of the single-family units built in 2001.
- ***Other Measures.*** 429 of the participating homes installed energy efficiency measures under the program either did not apply for or were not eligible to receive Vermont Star designation.

Preliminary of program records from 2002 show strong growth in the volume of program activity. The total number of units completing the program grew to 816, an increase of 31 percent over the previous year. The number of single-family homes completing the home rating tracks (Vermont Star homes enrolled in 2001 and Vermont Energy Star Homes) increased 46 percent from the previous year to a total of 287.

E.2 OVERVIEW OF THE PHASE 1 EVALUATION

E.2.1 Phase 1 Evaluation Objectives

Program Impact Assessment. The key Phase 1 research questions in regard to program impact are as follows.

1. ***Baseline.*** To what extent are the construction practices required by the programs used by participant builders and by nonparticipant builders? To what extent did participant builders use those practices prior to program enrollment?
2. ***Changes in construction practice***. How have construction practices changed since the implementation of the program? How do construction practices differ between homes that have gone through the program and those that have not?
3. ***Attribution of adoption of efficient building practices to program influence.*** To what extent do participant builders attribute changes in construction practices to information and experience gained through the program? To what extent do nonparticipants attribute changes in construction practices to program influences? (Untracked savings)

Market Characterization. The key research questions in regard to market characterization are as follows.

1. ***Size and segmentation of the new construction market.*** How large is the residential new construction market? What are its characteristics in terms of distribution by region, price, type of home (primary residence v. vacation), mode of construction (custom v. production v. owner-built v. manufactured housing) and features such as heating fuel? How large is the population of builders and how is it segmented by location, firm size, and specialty?
2. ***Baseline construction practices.*** What is the level of energy efficiency in current construction practice? What is the level of compliance with the technical and administrative provisions of the Residential Energy Building Standards ("RBES")?
3. ***Role of other market actors in promoting energy-efficient construction.*** To what extent and through what mechanisms do the following sets of market actors affect builders' decisions regarding energy efficient construction: HVAC and other trades contractors, home energy rating services, industry associations, lenders?

Process Evaluation. The key research questions in regard to process evaluation are as follows.

1. What are Vermont Star Home participants' key motives for enrolling; why do nonparticipants stay away?
2. What program elements do builders and homebuyers find most useful?
3. What incentives or information could convince builders to implement the Vermont Star standards on a larger percentage of homes?

Recommendations for program improvement. Based on review of the analyses described above and experience in evaluating and operating other residential new construction programs, XENERGY developed a set of recommendations designed to improve the performance and/or cost-effectiveness of the RNC.

E.2.2 Methods and Activities

Table E-1 summarizes the research activities and analysis activities undertaken to support the evaluation.

Table E-1
Summary of RNC Evaluation Primary Research and Analysis Activities

TASK/*Objective*	Description/Sample Approach & Size
SUPPLY-SIDE ANALYSIS	
Builder Survey	Probe current practices in regard to energy efficient construction and marketing, code compliance, program effects, perceptions of program, customer demand, value of energy efficiency. Also split of work between new construction and renovation, geographic scope of activity. Random sample of 54 builders with quotas for 2 geographic zones, allocated by location of firms in the zones, with probability of selection proportional to size as measured by # of employees reported to Dun & Bradstreet
Remodeler Survey	Probe the same topics as builder survey. Also, explore opportunities and interest in potential retrofit energy efficiency measures and programs. Random sample of 35 remodeling contractors, with quota for kitchen remodelers. Sampling procedure similar to builder survey
In-depth Interviews with Other Market Actors	In-depth interviews with HVAC contractors, real estate agents, and lenders to probe influence on energy-related construction decisions; adoption of energy efficient practices, perception of builder practices, demand. 30 interviews in all, with samples systematically selected to provide representation for key subgroups and all geographic regions.
DEMAND-SIDE ANALYSIS	
Analysis of Property Tax Records	Analyzed "Grand Lists" of land parcel property tax status submitted by 230 of Vermont's 260 towns to identify addresses on which new residential construction was likely to have occurred. Used other municipal sources for remaining towns to develop similar lists.
Telephone Survey of Recent Homebuyers	Closed-ended survey to probe customer experience with builders, knowledge of programs, codes and energy efficiency measures. Contact was also used to recruit participants for on-site surveys. Statewide random sample of 200. Sample frame developed from analysis of "Grand Lists" prepared by cities and towns for use in statewide property tax assessment and collection.
On-site Customer Survey	Assess "as built" adoption of efficient construction practices and products. Probe customer awareness and perception of value of energy efficient construction; experience with builder promotion of energy efficiency, awareness of program. Statewide random sample of 159
PROGRAM OPERATIONS	
Staff and Contractor Interviews	In-depth interviews with key program staff and delivery contractors. These interviews were used to gather details on administrative and marketing processes, history of program development and changes in design, perceptions of market response to the program, corroboration of findings from other sources, and response to preliminary recommendations.
Analysis of Program Records	Analysis of program data bases to assess patterns of participation by builders and consumers over time and by region.

E.3 OVERVIEW OF THE VERMONT HOUSING MARKET

Assessment of the effectiveness of the RNC requires an understanding of the structure and operation of the market for new housing in Vermont. The key features of this market are as follows.

E.3.1 Market Size and Structure

The Demand Side

Market Size. Based on analysis and assessment of four different sources of estimates for the number of new homes built in Vermont, we estimate that between 2,600 and 2,800 housing units were built annually between 1999 and 2001, and that the number increased slightly each year.

Distribution by Type. About 85 percent of the units built each year are single-family homes. Roughly 10 percent are in multifamily buildings of 5 or more units. The remaining 5 percent are in 2 – 4 family homes.

Owner-built v. Builder/Developer-built homes. Roughly 20 percent of all single-family homes are built by the owner acting as general contractor.

Manufactured Housing. Manufactured housing – mobile homes and site-assembled units – account for 17 percent of all new single-family homes built in Vermont.

Custom versus "spec" built. Only 6 percent of homes occupied by respondents to the telephone survey were "spec built", that is: completed entirely prior to purchase. Sixty-two percent were custom built to the plans developed exclusively for the owner; 15 percent were built according to stock plans customized to the owner's needs; the remainder were manufactured housing.

Geographic Distribution. Table E-2 shows the distribution of new construction activity in 1999 by housing market area. These areas were defined in consultation with individuals familiar with the Vermont housing market and represent regions with varying economic characteristics and networks of builders and related organizations.[1]

Table E-2
Regional Distribution New Housing Units (1999) and Vermont Star Homes (2000)

Housing Market Area	% of all Housing Units	Percent of Enrolled Homes[2]
Northeast	14%	2%
Northwest	48%	83%
Southeast	21%	9%
Southwest/South Central	17%	6%

The Supply Side

Market size. The supply side of the Vermont housing market is characterized by a huge population of establishments, each building relatively few units.

- ***Number of establishments.*** The number of establishments that claim single-family home construction as their primary line of business is very large in comparison to the number of homes built. Specifically, there are 560 such establishments versus 2,200 to 2,500 single-family homes built per year. There are an additional 70 establishments with other primary lines of business (primarily remodeling) that claim to be involved in residential new construction.
- ***Size distribution of establishments.*** These establishments are generally very small. Seventy-six percent of all builders employ fewer than 5 persons. Thirty-one percent are one-person operations.
- ***Geographic distribution.*** The geographic distribution of the listed builders by market area mirrors almost exactly the regional distribution of new home construction. This finding may imply that home building is very much a local activity in Vermont.

Average number of homes built and market share of size segments. Table E-3 shows the estimated total number of units built by all Vermont builders by size category, along with the percentage of total units accounted for by establishments in the size category, and the average

[1] The counties in the four market areas are as follows: Northwest: Chittenden, Franklin, Lamoille, Grand Isle, Washington. Northeast: Essex, Orleans, Caledonia. Southeast: Windham, Windsor, Orange. Southwest: Bennington, Rutland, Addison.

[2] To enroll in the program, either the builder or the owner must sign an agreement and return it with plans and forms describing energy features of the project.

number of units built. Small builders (those with 4 or fewer employees) accounted for the largest share of total units built (50 percent), although each establishment completed, on average, only 2.3 houses per year. Medium sized firms (5 to 24 employees) accounted for 40 percent of total construction, and the 12 largest firms in the state accounted for an estimated 229 units, or 9 percent of total units constructed. Clearly, residential new construction activity in Vermont is highly fragmented, especially when one takes into account the 15 – 20 percent of homes that are owner-built.

Table E-3
Volume of Construction and Market Share by Size Segment: 2001
Builder Sample: n = 54, Population Weighted

	Small	Medium	Large	All Builders
N =	544	125	12	693
Estimated Total Units Built	1,301	1,076	229	2,606
Share of Total Units	50%	41%	9%	100%
Average units built/establishment	2.3	8.6	19.1	3.8

Sources of Revenue/Involvement in Remodeling. Even among builders that list their primary business activity with Dun & Bradstreet as residential new construction, remodeling accounts for a substantial portion of revenues. Twenty-eight percent of all sample builders do commercial new construction, 70 percent are involved in residential remodeling, and 32 percent pursue commercial remodeling. The percentage of establishments involved in activities other than residential construction is highest among larger firms. Similarly, larger firms derive a greater portion of their total revenues (47 percent) from activities other than residential new construction. On average residential remodeling provided 17 percent of total revenues for the sample builders. Moreover, many firms who report residential new construction as their primary business activity to Dun & Bradstreet actually derive more than half of their revenue from remodeling.

Sales Prices. The sample builders were asked to estimate the average price of the custom and production homes they built in Vermont and sold in 2001. The mean of these estimates for custom-built units was approximately $475,152, while the mean price reported for production homes was $279,258. The median reported "typical" sales price for custom homes was $500,000. The corresponding figure for production homes was $212,000.

RBES and the Absence of Code Enforcement

In 1996, Vermont adopted an energy code (Residential Building Energy Standard or RBES) based on the 1995 Model Energy Code (CABO/MEC). A Task Force representing the full range of interested parties, after extensive study and consideration, recommended a number of additions and modifications to CABO/MEC including:

- Extension of coverage to building types not included in CABO/MEC;
- Prescriptive standards for water heaters;
- Requirements for vent dampers on exhaust fans;
- Measures to reduce air leakage associated with fireplaces; and
- A variety of thermal and glazing requirements over and above those in CABO/MEC.

Vermont has no statewide fire and life safety standards that apply to single-family new construction. Thus, Vermont municipalities have never provided building code inspection services for single-family homes, and the initial code development Task Force found that it would be infeasible to require municipalities to enforce the RBES. Code compliance is self-certified by the builder. Prior to occupancy, the builder is to provide the owner with a certificate of compliance. Further, the builder is to file copies of the certificate with the municipality and with the Vermont Department of Public Service.

For all intents and purposes, the home rating procedures embedded in the RNC constitute the only third-party code compliance verification mechanism available to builders and owners. As of the October 2000 report of the code update advisory committee – roughly two years after the code compliance rules took effect -- only 250 certificates of RBES compliance were on file with the DPS. In that time period, 4,000 to 5,000 housing units had been built in Vermont.[3]

E.4 SUMMARY OF PROGRAM ACTIVITY

Tables E-4 and E-5 summarize information about the volume of program enrollments and completions through the period of transition to EVT management and the first two full years of operation. Proper interpretation of these data is complicated by the fact that responsibility for new construction services to market-rate multi-family developments was transferred to another program in April 2001. Moreover, under current program operations multi-family projects are not "enrolled" using the same process as single-family projects, and therefore are not captured in the enrollment line after 2001. Table E-5 breaks out program completions by project type defined by the categories new construction v. remodeling and single-family v. multifamily. These tables show the following trends.

- ***Units completed.*** The level of overall program completions remained consistent between 1999 and 2001, varying between 617 in 2000, the year of management transition, to 650 in 1999. However, in 2002, the total number of units completed increased to 816, a difference of 31 percent from the previous year.

[3] Richmond Energy Associates. (2000). *Draft Report of the Vermont Residential Building Energy Standards Update Advisory Committee.*

- ***Units completing the home rating track.*** The number of completed single-family units passing through the Vermont Star or Vermont Energy Star components has increased steadily since EVT assumed management responsibility for the program. In 2000, the number of qualifying units totaled 93. This figure more than doubled in 2001 to 196, and increased by an additional 46 percent to 287 in 2002.

Table E-4
Trend in Project Completions

	Pre-EVT		EVT Management		
Year	**1999**	**Jan – Feb 2000**	**Mar – Dec 2000**	**2001***	**2002**
UNITS ENROLLMENTS					
Advantage	n/a	n/a	599	270	n/a
Vermont Star Homes	n/a	n/a	287	380	n/a
Vermont Energy Star Homes	n/a	n/a	n/a	49	701
Total Enrolled	**978**	**233**	**886**	**699**	**701**
UNITS COMPLETED					
Advantage	540	182	323	429	205
Vermont Star Homes	110	19	93	196	148
Vermont Energy Star Homes					139
Multifamily Units			294**	320**	324
Total Completed	**650**	**201**	**416**	**625**	**816**

* Management of market rate multi-family projects moved to another program in April, 2001.

** Included in Advantage and Vermont Star Homes rows above.

Table E-5 shows the distribution of projects completed under EVT management by type: single v. multi-family and new construction v. renovations and additions. The table shows that, through 2001, the number of units completed through the program was split roughly evenly between single- and multifamily projects. Renovation projects made up about 10 percent of the project flow.

Table E-5
Distribution of EVT Unit Completions by Project Type

		Units Completed		
		2000 (Mar – Dec)	2001	2002
Single Family	Rehab	17	33	492
Single Family	NC	281	270	
Multifamily	Rehab	47	31	n/a
Multifamily	NC	247	289	324
		592	623	816

E.5 BASELINE CONSTRUCTION PRACTICES AND PROGRAM EFFECTS

E.5.1 Changes in Baseline Construction Practices: 1995 and 2002

Table E-6 compares key results of on-site surveys of newly constructed Vermont homes conducted in 1995 and 2002. The table shows that the energy efficiency of new homes in Vermont improved in many respects over that period. Nearly 60 percent of the homes inspected in 2002 met the RBES requirements for total thermal transmittance (UA), versus an estimated 35 to 40 percent in 1995. Other construction elements that improved substantially included the level of insulation in walls, the level of insulation in basement walls, the presence of mechanical ventilation, and measured air infiltration. Moreover, the saturation of high efficiency central heating plants increased, and very inefficient tankless water heating systems were virtually eliminated.

E.5.2 Association of Efficient Construction Features and Equipment with RNC Participation

Comparison of the energy efficiency characteristics of homes that participated in the RNC or predecessor programs and those that did not was complicated in some cases by the absence of definitive documentation of program participation . However, using owner self-reports to define participation status, the following emerged as clear differences between homes that went through the program and those that did not.

- ***RBES Compliance.*** As discussed above, 59 percent of homes in the sample met RBES requirements for general thermal transmittance. All qualifying Vermont Star or Vermont Energy Star homes would meet this standard.
- ***Glazing Materials.*** Fifty-three percent of participants' homes had gas-filled low-e windows, versus 20 percent for nonparticipants.

Table E-6
Comparison of 1995 and 2002 On-site Home Inspection Results

Compliance Feature	1995 n = 151*	2002 n = 158*	Comments
Percent of homes meeting UA Requirements	35 – 40%	59%	1995 compliance estimate based on homes with prescriptive requirements
Attic insulation meets or exceeds code requirements	61%	68%	
Wall insulation meets or exceeds code requirements	57%	90%	
Basement wall insulation meets or exceed code requirements	48%	62%	
% glazing area with 2-pane, Low-e	70%	80%	Window/wall ratio higher for 2002 homes
Mean Air Infiltration	~.45 ACH	.31 ACH	
Mechanical ventilation installed per proposed code update	6%	32%	
Mean AFUE of Central Heating Systems	n/a	0.850	General improvement observed. In 1995, 20 percent of boilers did not meet code requirement: AFUE 80.
Mean Heating system Oversizing Factor	>100 %	92%	In 1995, 71 percent of heating systems were more than 100% oversized.
Percent with tankless coil water heating	32%	3%	

* The sample for the 1995 study was developed from lists provided by Green Mountain Power, Central Vermont Public Service and Citizens Utilities. The sample selection process did not cover the full state, and documentation for development of the sample is incomplete. The sample for 2002 survey was developed through a random process using a statewide list of new homes developed through analysis of municipal records.

- ***Mechanical ventilation.*** Seventy percent of participants' homes had mechanical ventilation systems that complied with the DPS's proposed RBES update versus 15 percent of nonparticipants.
- ***Compact Fluorescent Lighting.*** Eighty percent of participants homes had compact fluorescent lighting fixtures installed, with an average of 5.52 fixtures per home. Only 31 percent of nonparticipants had CF fixtures installed, with an average of 1.16 fixtures per home.

E.6 PROGRAM INFLUENCE ON BUILDER PRACTICE

Influence on construction practices. In addition to the evidence of program influence provided by the on-site survey, the twelve sample builders who participated in the program reported that the program had significant influence on their adoption of various efficiency measures and on their use of those measures in other homes they built. This finding was particularly strong in regard to low-e glazing, compact fluorescent fixtures, high efficiency heating equipment, insulation above code requirements, and the use of a third party home energy rating service.

Marketing and Selling Vermont Star Homes.

- ***Effects of program requirements on construction costs.*** Nine of the 12 participating builders interviewed indicated that installing features required to meet Vermont Energy Star specification resulted in added construction costs compared to homes without those features. The median estimate for added construction costs was $4,000, and the estimates ranged from $1,000 to $20,000. One of the participating builders reported that he incurred no added costs to meet program requirements; one was unsure of the amount of the added costs; and the third was unsure whether compliance with program requirements had added costs to the project.
- ***Effects of program qualification on salability.*** Eight of the 12 builders interviewed reported that they were able to sell qualified homes more easily than other, similar homes built during the same period.
- ***Effects of program qualification on sales prices.*** Seven of the 12 builders interviewed reported that they were able to obtain a higher selling price for homes qualified by the program. Most builders were unable to indicate the average increase in selling price for qualified homes, stating that the price increase generally depends on the general desirability of the home (size, location, etc) before considering efficient construction or features. Among those who were able to indicate a price increase, estimates ranged from $4,000 to $20,000 and averaged $7,815.

E.7 PROCESS EVALUATION AND RECOMMENDATIONS

E.7.1 Overview

The findings presented in the previous sections suggest the following conclusions about the operations and impact of the Efficiency Vermont Residential New Construction program.

- ***Single-family homes that go through the program clearly exhibit higher levels of energy efficiency than those that do not.***
- ***The program has done a good job of serving multifamily developments.*** In 2000, the program completed projects in 84 percent of the estimated number of multifamily units

(in structures with 2 or more units) built in Vermont. The corresponding figure in 2001 was 73 percent.

- ***While the number of total single-family units receiving program qualification increased in the current year (2002), it is still relatively low in comparison to the total volume of new home construction.*** In 2000, the program completed projects accounting for approximately13 percent of the estimated number of new single-family homes built in Vermont. The corresponding figure for 2001 was 12 percent. In 2001, 196 homes met program specifications. In 2002, 287 homes met Vermont Star or Vermont Energy Star specification – an increase of 46 percent in the number of units over the previous year. Assuming the total volume of single-family home construction remained stable between 2001 and 2002 (at roughly 2,350 units), the share qualified by the program also remained relatively constant at 13 percent.
- ***Program participation remains concentrated in the Northwest region.*** Despite diligent efforts on the part of Vermont*wise* to identify and track housing starts, most of the construction activity in areas outside the Northwest appears to be falling through the cracks. In 2001, market areas other than the Northwest accounted for 19 percent of the program's enrollments, even though they hosted more than one-half of single-family new home construction. Over the life of the program, the Northwest region has accounted for over 85 percent of the program's project completions.

Key area for program improvement: increase volume. Given the above findings, it is clear that the key to increasing the effectiveness of the RNC program is to increase the number of single-family homes that go through the qualification process. EVT and Vermont*wise* have already taken a number of important steps towards that objective. The two most important were to simplify the structure of the program and to establish the cooperative working arrangement with VGS. Both make the program(s) easier for builders and owners to identify, understand, and enroll in. The elimination of the requirement for participants to pay the home energy rating fee up front also appears to have removed a disincentive to participation. However, more efforts will be required if the RNC is to have a significant impact on the overall energy efficiency level of new homes built in Vermont.

EVT and Vermont*wise* will need to find ways to overcome the challenges posed by the fragmentation of the new construction market and the continued high demand for new homes in order to increase program volume.

E.7.2 Specific Findings and Recommendations

Findings: Marketing and Communications

General Recognition. Only 3 of the 54 builders interviewed for this evaluation reported that they had not heard of the Vermont Star Homes Program. In addition, 8 of the 24 individuals representing firms listed as builders in D&B but transferred to the remodeler sample reported

that they had not heard of Vermont Star Homes. All of these individuals represented firms with 1 or 2 employees.[4]

Understanding of the program. Understanding of program objectives and requirements varied greatly among the sample builders and remodelers. Generally, we found a fair amount of confusion about program benefits and requirements. Some of this confusion may be due to the changes in program name and features in recent years.

Builder perceptions of marketing efforts. Builders generally felt that Efficiency Vermont needed to do more to publicize the program and to keep builders abreast of changes in program requirements. At the end of the builder survey, all respondents were asked to identify steps that Efficiency Vermont could take to promote energy efficiency in new construction and renovation. Twenty-six of the respondents, including all of the twelve builders who had participated in the program offered one suggestion each. The most frequent suggestion regarding program improvement was to increase outreach and education to builders (8 of 26 suggestions offered). Four other respondents volunteered that the program should do more to promote itself in response to other open-ended questions.

Suggested channels for program information. Four of the builders interviewed were aware of the annual conference and other seminars that Efficiency Vermont offered and believed that they were very valuable. In addition, builders and remodelers identified the following potential channels for distribution of information: media advertising, zoning boards and town clerks' offices, remodeling trade shows, and direct mail.

Perceptions of costs of compliance. Vermont*wise* and EVT staff found builders' estimates of the cost of required construction features to be extraordinarily high. Program managers and staff estimated that the costs of compliance in most homes would be no more than $1,000 to $2,000 and mentioned that some measures, such as direct vent boilers with no flues, might actually cost less than their less efficient counterparts. Clearly, this is one area in which more builder education is needed.

Manufactured Homes. According to the on-site survey and telephone surveys, manufactured homes account for a substantial portion – 17 percent or more -- of new home construction. Here we are referring to homes that are assembled on-site using factory-produced components, not to mobile homes. Construction standards for "double-wides" and other types of mobile homes are established and administered by the U. S. Department of Housing and Urban Development. They are not eligible to participate in the program. Only two of the homes in the on-site sample fit the HUD definition of mobile home. Moreover, the on-site survey found that manufactured homes were less likely to be energy efficient than other kinds of housing. According to Dun & Bradstreet, there are only 6 establishments in Vermont that list erection of prefabricated housing as their main business activity. Builder lists compiled by EVT suggest that there are a relatively small number of additional businesses in Vermont that erect manufactured housing as one of their services.

[4] One possible explanation for this finding is that Vermont Energy Star Homes does not provide services for projects that involve remodeling only.

Recommendations: Marketing and Communications

EVT and Vermont*wise* have already undertaken a number of marketing and communication activities to increase recognition and use of the program among targeted market segments and regions. These efforts have included the following:

- On a regular basis, EVT sends targeted direct mail of program materials to builders outside the Northwest region with follow-up phone calls to identify builders with projects in the early stages of development.
- EVT has hired a part-time RNC business development specialist to market the program, with emphasis on regions that have been underrepresented to date.
- EVT has distributed program materials through municipal officials in towns outside the Northwest, including mailings of posters and materials to Town Clerks.
- EVT has approached some of the larger builders of manufactured homes concerning their interest in training and participation in the program.

XENERGY recommends reserving some incentive funds for the RNC business development specialist to use to stimulate participation builders in areas outside the Northwest, or for special incentives to first-time participants.

Findings: Project Tracking Processes

Attrition of enrolled projects. According to annual program activity statistics, the number of projects enrolled in the program is considerably greater than the number of project completions, particularly in the home rating track. One way to increase program volume would be to increase the percentage of enrolled projects that make it through the qualifying process. Unfortunately, the annual statistics provide little information on which to develop a strategy to accomplish that objective. Construction projects often span two or more program years, and some planned projects are never completed. It is impossible to tell from the annual figures what percentage of projects drop out for various possible reasons: abandonment, postponement, loss of builder or owner commitment to follow through.

Identification of completed projects. In the course of completing the on-site survey, the evaluation contractor experienced difficulties in gaining definitive information on the program participation status of some of the sample homes. This was particularly the case for Vermont Advantage participants, but there were some instances in which it was not possible to verify whether a home had received a home energy rating. Part of the problem stemmed from difficulties in matching addresses assigned to properties through the 911 location system to property identifiers stored in the program database.

Program share among participating builders. Perhaps the most efficient way to increase program volume would be to ensure that builders who have learned how to use the program send all of their projects through it. The participating builders interviewed for this evaluation reported that they had sought program qualification for roughly 60 percent of the homes they completed

in 2001. This finding raises the question of why they did not seek to meet program qualifications for all of the units they completed.

Recommendations

Intervention to limit program attrition. To initiate the development of processes to increase the conversion of enrolled projects, we recommend that the evaluation contractor be given a task early in the next phase of work to analyze Vermont*wise*'s lead tracking data base and to conduct a survey of a small sample of "drop outs" to ascertain the disposition of the project and reasons for not following through with the program.

Ensuring identification of completed projects. There should be some way of updating project records upon completion to capture permanent address information. Another approach might be to post some kind of permanent marker in the home to signify that it has been qualified by the program.

Increasing program share among participating builders. According to Vermont*wise* staff, the program regularly contacts builders who have participated in the past to develop leads for future projects. Program staff could use this occasion to gather information on the extent of their activities outside the program and to probe reasons why they chose not to seek program qualification for some of their homes. Alternatively, the evaluation contractor could undertake a more in-depth survey of participating builders to gain detailed information on their response to the program and to test potential strategies for increasing the share of units for which program qualification is sought.